

TECHNOLOGIES THAT COMPLEMENT THE NATIONAL INFORMATION EXCHANGE MODEL (NIEM)

Improved human-system integration (HSI) through technological innovation in the processing and sharing of mission-critical information is an important and worthwhile focus of the House Ways and Means Committee, Subcommittee on Human Resources. The National Information Exchange Model (NIEM) is a simple concept for information sharing with profound implications for improving government services through more effective use of human resources in such diverse areas as air traffic control, electronic medical records, medical device interoperability, the so-called “smart grid”, and many others – anywhere data/information exchange between humans and systems is required.

The concept is simple: Communities of interest develop standard data structures which are then expressed in a straightforward form that can be read by both humans and machines. The value of the approach is huge: In today's increasingly network-centric environment, the efficient exchange of information among systems, and between systems and humans acts as a “force multiplier,” a concept that has proven of incalculable value in defense and strategic operations, and is rapidly gaining traction in non-defense applications.

NIEM, and its technological cousins such as the Department of Defense Architecture Framework (DODAF), represent “overnight” breakthroughs that were years in the making. The NIEM program, a joint initiative of DHS and DOJ, is one of those rare examples of technology that actually works. An important emerging technology, known as Concept Mapping, is closely related. Concept Maps are pictures of information structures that are drawn by human experts, and then translated into NIEM-compatible data structures. A Center of Excellence in the development of concept mapping technology is the Institute for Human and Machine Cognition in Pensacola, Florida (<http://www.ihmc.us/>), founded by Dr. Ken Ford, who is currently on the Defense Science Board, and, until September, 2011, was Chairman of the NASA Advisory Council. Another relevant technology is

the Hybrid Cognitive Task Analysis system developed by Dr. Missy Cummings and her team at MIT's Humans and Automation Laboratory (HAL) (<http://web.mit.edu/aeroastro/labs/halab/about.shtml>). Dr. Cummings is presently on the technical staff of the Office of Naval Research. An initiative to develop standards for symbology for the FAA's Next-Generation Air Traffic Control System, sponsored by the Human Factors program at FAA Headquarters (Code ANG-C1) is moving in this same direction.

Private sector research is also awakening to the possibilities of improved interoperability. A recent smart-grid initiative by General Electric's Global Research Laboratory concluded that improvements in information exchange can have both positive and negative impacts on the nation's electric power distribution infrastructure. A Committee of the Association for the Advancement of Medical Instrumentation (AAMI) is exploring development of an international standard for medical devices, in which the prospective benefits of NIEM for improved interoperability among medical devices and electronic medical records is being evaluated. These and other research and development projects, funded by various public and private sources, have at least one thing in common – improved exchange of information between and among machines and humans. Much of this important work is being done by innovative small businesses in support of these large enterprises. These efforts offer both near-term and long-term benefits to improving HSI, and deserve the Subcommittee's attention.

For decades, this country has maintained its economic strength and security by maintaining strategic focus on technological leadership – particularly in information technology. If we are to sustain our strength in the challenging economic climate ahead, it is imperative that we understand the importance of that singular fact, and continue to exploit advances in information technology in every aspect of government. I thank the Subcommittee for its valuable work in this area.

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